considerations. For example, amendments have been made to broaden the claims; to remove reference numerals in the claims; remove the European phrase "characterized in that"; remove multiple dependencies in the claims; and to place claims in a more recognizable U.S. form, including the use of the transitional phrase "comprising" as well as the phrase "wherein". Other such non-narrowing amendments include adding the phrase --at least one of-- for consistency, and placing apparatus claims (elements set forth in separate paragraphs) in a more recognizable U.S. form. Again, all amendments are non-narrowing and have been made solely to place the claims in proper form for U.S. practice and not to overcome any prior art or for any other statutory considerations.

## SUBSTITUTE SPECIFICATION

In accordance with 37 C.F.R. §1.125, a substitute specification has been included in lieu of substitute paragraphs in connection with the present Preliminary Amendment. The substitute specification is submitted in clean form, attached hereto, and is accompanied by a marked-up version showing the changes made to the original specification. The changes have been made in an effort to place the specification in better form for U.S. practice. No new matter has been added by these changes to the specification. Further, the substitute specification includes paragraph numbers to facilitate amendment practice as requested by the U.S. Patent and Trademark Office.

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## CONCLUSION

Accordingly, in view of the above amendments and remarks, an early indication of the allowability of each of claims 1-8 in connection with the present application is earnestly solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Donald J. Daley at the telephone number of the undersigned below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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MARKED-UP VERSION OF SPECIFICATION

~~Description~~

# Automation system with automation objects with a directory structure and method for the management of automation objects in a directory structure

## FIELD OF THE INVENTION

The invention relates to an automation system which has at least one automation object.

## BACKGROUND OF THE INVENTION

An automation system of this type is used in particular in the area of automation technology. An automation system of this type generally ~~comprises~~ includes a multiplicity of individual automation objects, which are frequently highly dependent on the automation object of the engineering system respectively used. This has the consequence that automation objects of one manufacturer often require their own engineering system and cannot be used in other systems with automation objects of other manufacturers.

Robert Orfali et al: "The Essential Distributed Objects Survival Guide", 1996, John Wiley & Sons Inc., New York, USA, XP002152444, discloses the standardized middleware CORBA, which allows location-, platform- and implementation-independent communication between applications. The CORBA Version 2.0 makes it possible for messages be exchanged between Object Request Brokers (ORB) of various manufacturers and in particular also over the Internet. An ORB makes it possible for a client to send a message transparently to a server object, the server object being able to run on the same machine or another machine. The ORB is responsible for finding the server object, calling up the function there, transferring the parameters and returning the result to the client.

Summary of the Invention



The invention is based on the object of specifying an automation system which makes it possible for automation solutions to be created on a parallel and/or distributed basis.

This and/or other objects are ~~This object is~~ achieved by an automation system with the features specified in claim 1.

The invention is based on the realization that in previous solutions, the data of the automation solution were ~~are~~ generally stored in a central data store such as a database

system. The data storage system then ~~controls~~ Controlled the access of various users to the data. In this case, it ~~is~~ was ensured that each user only ~~sees~~ saw consistent data and ~~is~~ was isolated from changes made by other users. This generally ~~takes~~ took place by a user being granted exclusive access to his required data. In this time, these data ~~are~~ were not available to other users for working on them. Therefore, this solution ~~has~~ had the following disadvantages:

- **No parallel working:** users ~~can~~ could only work on the same data records one after the other.
- **Slow exchange of partial results:** results only ~~become~~ became usable for other users when the data ~~have~~ had been released again by the last person working on them.
- **No joint working:** a number of users ~~cannot~~ could not work on the same objects together and exchange interim results.

The solution according to the invention permits immediate and permanent access to currently created partial solutions by the special way in which the directory is structured as a directory service. The directory service provides all developers with access to the current partial solutions and automation objects. This results in the following advantages:

- **Parallel working:** users can work on the same data records, required for different tasks (for example interconnection and parameterization), on a parallel basis.
- **Immediate availability of partial results:** results become usable for other users more quickly, not only when the data are released again by the last person working on them.
- **Joint working:** a number of users can work on the same objects together and exchange interim results.
- **Distributed working:** users can work on a (spatially) distributed basis; by means of the directory, they can, if need be, always re-synchronize the stages

they have reached in working.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described in more detail and explained below on the basis of the exemplary embodiments represented in the figures, in which:

figure 1 shows a basic representation of how a directory is structured and its entries and

figure 2 shows a schematic representation of the use of the directory entries.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a basic representation of how a directory is structured and its entries. The automation system has a directory V, in which object names O1..On of automation objects can be stored. Each object name O1..On is assigned a directory entry, which contains first information data O11 for an object reference, second information data O12 as a list of the modules contained in the automation object, third information data (O13) for the identification of interface data and fourth information data (O14) with names of subcomponents.

With the aid of the directory structure shown in figure 1, references to created (partial) solutions and/or automation objects are stored with descriptive data. As in a telephone book, the name of the object can be used to find its reference (i.e. its telephone number).

Along with a reference to the actual object, the entry ~~comprises~~ includes a description of its technological functionality through the list of names of the modules contained, a listing of the names of any subcomponents and a description of its interface, which makes it possible for other objects/tools to use the objects referenced in this way.

Figure 2 illustrates a schematic representation of the use of the directory entries. After the creation of an object, it is entered at certain points in time in the directory as entry OE1 for a first automation object. It can then be viewed by other users/tools. They can then use the name to request a reference to the object and work on or copy the latter directly.

Entering or changing or removing an object entry in the directory does not have to take place instantaneously. Here, too, the analogy with a telephone book again applies: even if individual entries become invalid, as a whole it can still be used. This property is important in particular in the case of distributed working, since the communication expenditure is minimized in this way. If an object is still in the directory, but no longer available, this is indicated when it is attempted to request a copy.

To sum up, the invention consequently relates to an automation system which has at least one automation object 1, with a directory V for storing object names O1..On of the automation objects, an object name O1..On being assigned a directory entry Oe1..Oen which has first information data O11 as a reference to the automation object, second information data O12 as a description of the technological functionality and third information data O13 as a description of interfaces of the automation object. This results in immediate and permanent access to currently created (partial) solutions, so that parallel and/or distributed working on automation objects is possible.

VARIATIONS 9/

Patent claims

(Amended)

1. An automation system comprising: which has at least one automation object, with a directory (V) for storing object names (O1..On) of the at least one automation objects, an object name (O1..On) being assigned to a directory entry (OE1..Oen) which includes has first information data (O11) as a reference to the at least one automation object, second information data (O12) as a description of the technological functionality and third information data (O13) as a description of interfaces of the at least one automation object, it being possible, wherein once entry into the directory (V) has taken place, for the at least one automation object can to be viewed by at least one of other users and/or tools and it being possible to use wherein the object name (O1..On) of the at least one automation object can be used to request a reference to the at least one automation object and wherein the at least one automation object can to be worked on by a number of users in parallel.

(Amended)

2. The automation system as claimed in claim 1, characterized in that wherein the directory entry (OE1) has includes fourth information data (O14) for listing the names of subcomponents of the at least one automation object.

(Amended)

3. The automation system as claimed in either of claims claim 1 and 2, characterized in that wherein the automation system has includes means for the automatic entry of an automation object into the directory (V).

(Amended)

4. The automation system as claimed in one of claims claim 1 to 3, characterized in that wherein the automation system has includes means which for indicating indicate that an automation object is no longer available and that a copy of the object is being created.

NEW



5. Same as 3, but dep on 2
6. same as 4, but dep on 2
7. Same as 4 but dep on 3
8. Same as 4, but dep on 5

GR 99 P 3132

MARKED-UP ABSTRACT

Abstract

Automation system with automation objects with a directory structure and method for the management of automation objects in a directory structure

~~The invention relates to an~~ An automation system ~~which has~~ includes at least one automation object ~~(1)~~, with a directory ~~(V)~~ for storing object names ~~(O1..On)~~ of the at least one automation objects. An object name ~~(O1..On) being~~ is assigned a directory entry ~~(OE1..Oen)~~ which ~~has~~ includes first information data ~~(O11)~~ as a reference to the automation object; second information data ~~(O12)~~ as a description of ~~the~~ technological functionality; and third information data ~~(O13)~~ as a description of interfaces of the automation object. This results in immediate and permanent access to currently created (partial) solutions, so that parallel and/or distributed working on automation objects is possible.

~~Figure 1~~